

# Real-World Applications of Quadratic Functions

Scenario:

During halftime at a Bulls basketball game, the Luvabulls cheerleaders use a slingshot to launch t-shirts at the crowd.  
 The function  $h = -16t^2 + 30t + 5$  gives the t-shirt's height  $h$ , in feet, after  $t$  seconds.

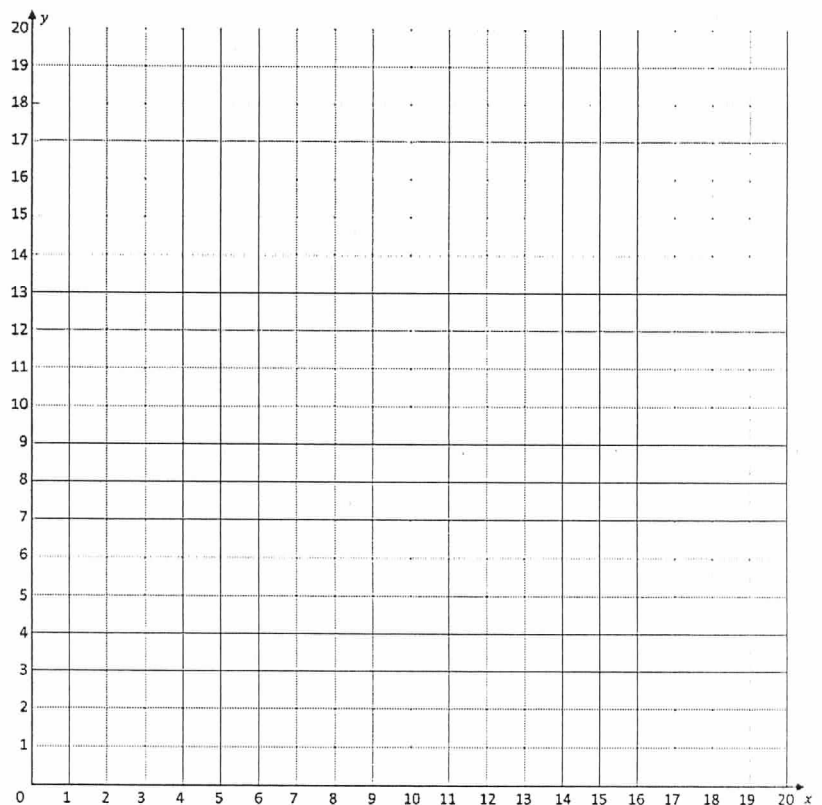
Equation:

Axis of Symmetry:

Vertex:

$t$	$h$

Sketch the graph:



Analysis Questions:

- What is the maximum height a t-shirt will reach? \_\_\_\_\_
- How many total seconds will the t-shirt be in the air? \_\_\_\_\_
- After how many seconds will the t-shirt reach its highest point? \_\_\_\_\_
- At 0 seconds, the graph starts at \_\_\_\_\_. Why is this? \_\_\_\_\_

Scenario:

A baseball is hit at a point 3 feet above the ground at a velocity of 100 feet per second and at an angle of 45 degrees with respect to the ground. The path of the baseball is given by the function  $f(x) = -0.0032x^2 + x + 3$ , where  $f(x)$  is the height of the baseball (in feet) and  $x$  is the horizontal distance from home plate (in feet).

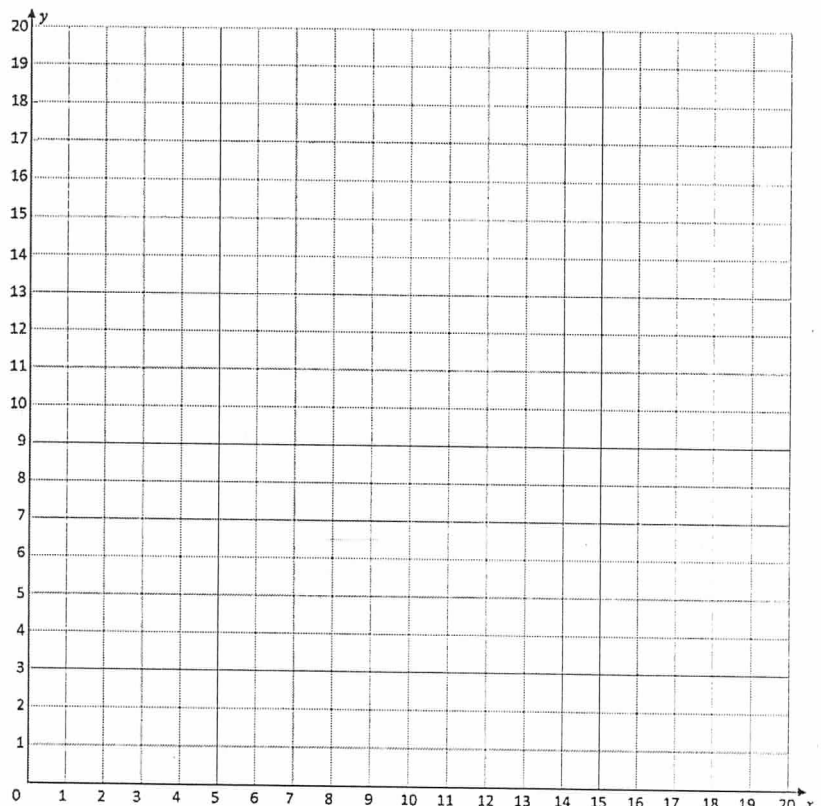
Equation:

Axis of Symmetry:

Vertex:

x	y

Sketch the graph:



Analysis Questions:

5. What are the zeros (solutions)? \_\_\_\_\_
6. How far from home plate did the ball go? \_\_\_\_\_
7. What was the horizontal distance when the ball reached its highest point? \_\_\_\_\_
8. What was the vertical height of the ball when it reached its highest point? \_\_\_\_\_
9. Why did the graph start at (0,3) instead of (0,0)? \_\_\_\_\_

Scenario:

In the shot put, an athlete throws a heavy metal ball through the air.  
The arc of the ball can be modeled by the equation  $y = -0.04x^2 + 0.54x + 2$ ,  
where  $x$  is the horizontal distance, in meters, of the ball, and where  $y$  is the vertical distance, in meters, of the ball.

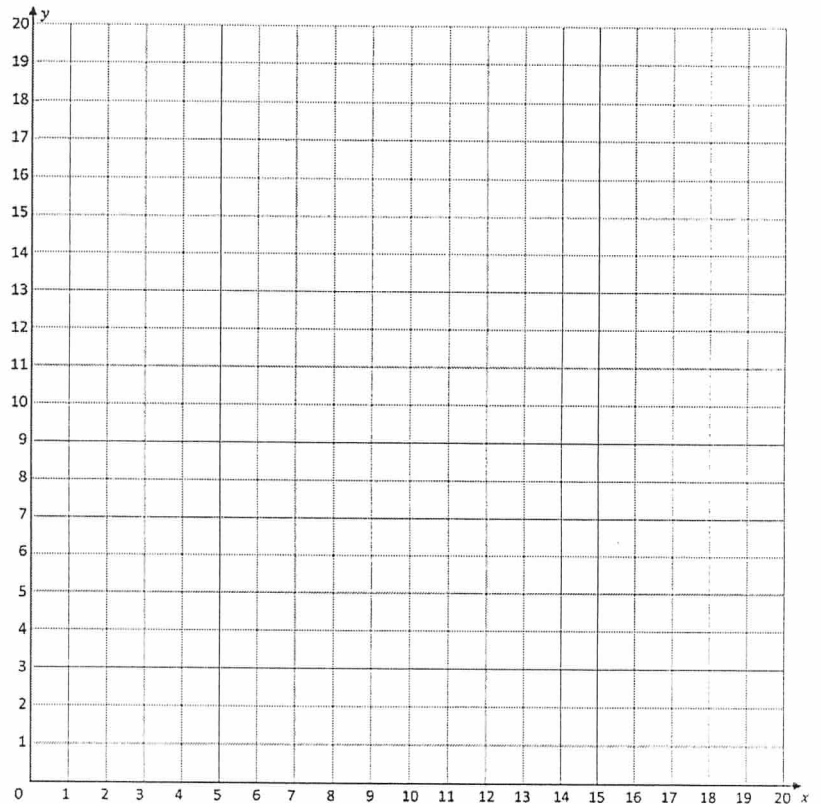
Equation:

Axis of Symmetry:

Vertex:

$x$	$y$

Sketch the graph:



Analysis Questions:

10. How far from the athlete did the ball land? \_\_\_\_\_
11. From how high off the ground was the ball thrown? \_\_\_\_\_
12. How do you know? \_\_\_\_\_
13. What was the height of the ball when it reached its highest point? \_\_\_\_\_
14. How far away is the ball when it reaches a height of 5 feet? \_\_\_\_\_